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# GRAPEFRUIT

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# GRAPEFRUIT

H. R. WELLMAN<sup>1</sup> AND E. W. BRAUN<sup>2</sup>

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## SUMMARY

The commercial production of grapefruit in the United States is confined to the four states of Florida, California, Texas, and Arizona. At the present time Florida is by far the most important of these four states in quantity of production. Over 90 per cent of the total carlot shipments in the United States in 1926-27 originated in Florida. Texas and California each supplied less than 4 per cent of the total; while only 1 per cent came from Arizona.

Each of the four grapefruit-producing states has experienced a substantial increase in bearing acreage, production, and shipments during recent years, and it is likely that this expansion will continue during the next few years.

In Florida the bearing acreage was trebled between 1919 and 1928. Shipments also increased rapidly up to 1925, but since then they have been considerably below normal because of the unfavorable conditions in that state. The low crop in 1925-26 was a result of neglect arising out of the real estate boom; the 1926-27 crop was injured by frost and hurricane; and the 1927-28 crop, by frost and drought.

These unfavorable conditions, however, should not be expected to continue, in which case the yield per acre will be substantially higher. Furthermore, an additional increase in the yield per acre may be expected as the present bearing trees become older, since a considerable proportion of those now in bearing have not yet reached the age of full bearing. In addition to a larger yield per acre, it is expected that there will be some increase in the bearing acreage. As a result of these two factors, increased yield and increased bearing acreage, the production of grapefruit in Florida is likely to be much larger during the next few years than it has been in the past.

The future rate of increase in grapefruit production in Texas is likely to be even larger than in Florida. Texas has only recently become an important factor in the grapefruit situation. In the past few years the expansion in that state has been very rapid. In 1921-22 only eight cars of grapefruit were shipped from Texas; this season (1927-28) over 1,000 cars have been shipped. Plantings of grapefruit in Texas during recent years have been very large. According

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to a recent census there were 34,440 acres of grapefruit in the lower Rio Grande Valley of Texas in 1928, only 14 per cent of which were in bearing.

As yet Arizona has not been an important factor in grapefruit production, but she is likely to become so very shortly. Less than one-half of the 3,800 acres of grapefruit in that state is not yet in bearing, and a much larger proportion has not reached the age of full bearing. Furthermore, heavy plantings are in prospect during the next few years.

The bearing acreage of grapefruit in California has increased 79 per cent in the past three years, and the large non-bearing acreage indicates that there will be a further substantial increase during the next few years. Most of the recent plantings of grapefruit in this state have been made in the Imperial Valley. In 1921 Imperial County contained only 3 per cent of the total bearing acreage in the state; by 1928 it contained 47 per cent of the total bearing acreage and 80 per cent of the total non-bearing acreage.

The bulk of the grapefruit produced in Imperial Valley is marketed between October and May. This is also the period when the grapefruit from every other producing section in the United States, with the single exception of the southern district of California, reaches the market. The recent expansion in California, therefore, has been made in a district which ships grapefruit at the time when the competition is greatest. The central district of California also ships its grapefruit during the winter and spring months. On the other hand, the southern district ships the bulk of its crop during the summer months. Consequently, it has not had to meet such intense competition, and as a result the prices received have been higher on the average.

Beginning with the 1924-25 season and including the 1927-28 season, California grapefruit growers have enjoyed four years of high prices. These high prices were the result of several conditions: the demand for grapefruit has increased steadily; the supplies of grapefruit have been below normal; and the total winter orange crop has been short for four successive years.

The increase in the demand for grapefruit seems to be of a permanent character. The per capita consumption of grapefruit in the United States increased almost 40 per cent from 1920-21 to 1923-24, although prices did not decline. During the two years of 1925-26 and 1926-27 the per capita consumption averaged 12 per cent below that of 1923-24 because of the low supplies in this country. Prices during these two years, however, averaged 25 per cent higher than in 1923-24.

The subnormal conditions in Florida during the past few years affected the winter orange supplies as well as the grapefruit supplies. Since oranges compete directly with grapefruit in the consuming markets, the small crops of oranges in Florida greatly reduced the competition which grapefruit would otherwise have experienced.

Foreign markets have offered an outlet for increased supplies of grapefruit during recent years. At the present time Canada and the United Kingdom are our principal foreign markets. The consumption of grapefruit in the United Kingdom has increased rapidly since the war. According to official statistics the United Kingdom imported only 40,000 boxes of grapefruit in 1921 as against 700,000 boxes in 1927. Over 80 per cent of the British imports in 1927 were reported as coming from the United States. The United Kingdom also receives grapefruit from the British West Indies, the Union of South Africa, and Cuba. There will very likely be a further increase in the demand for grapefruit in the United Kingdom. The per capita consumption in that country in 1927 amounted to only 1 grapefruit, whereas the per capita consumption in the United States amounted to 4.5 grapefruits. It is questionable, however, if the increase in the demand in the United Kingdom will be sufficient at the present level of prices to provide an outlet for more than a small part of the probable increase in our production.

*What of the Future.*—The available facts indicate that California grapefruit growers are likely to experience much greater competition during the winter months in the coming years than they have in the past few years. With the return to normal conditions in Florida, it is expected that the supplies of both grapefruit and winter oranges from that state will be substantially larger. In addition the larger shipments of grapefruit from Texas, Arizona, and California will probably add greatly to the future supplies. Some further increase in the demand for grapefruit, both here and abroad, may be expected, but it is doubtful if the demand will be increased as rapidly as supplies are likely to increase. In view of the probable developments during the next few years, it does not appear likely that the present high level of prices in the winter months can be maintained.

Growers of summer grapefruit, however, are in a more favorable position. In recent years there have been practically no plantings of grapefruit in sections which ship during the summer months. Consequently, the supplies of fresh summer grapefruit are not likely to be increased. On the other hand, if a very large expansion in the canning of grapefruit occurs, it will tend to extend the marketing season for winter grapefruit into the summer months.



## ACREAGE

*United States Acreage of Grapefruit.*—The four main grapefruit-producing states of the Union are Florida, California, Texas, and Arizona. In 1924 these four states contained a total of 66,445 acres, of which 89.4 per cent were in Florida, 6.3 per cent in California, 3.4 per cent in Texas, and 0.9 per cent in Arizona.

TABLE 1

ESTIMATED BEARING ACREAGE OF GRAPEFRUIT, UNITED STATES BY STATES,  
1919-1928

Year	California	Florida	Texas	Arizona
	<i>acres</i>	<i>acres</i>	<i>acres</i>	<i>acres</i>
1919	2,568	33,600	80	270
1920	3,109	41,000	.....	310
1921	3,642	47,000	.....	360
1922	3,935	51,000	.....	370
1923	4,067	53,000	.....	370
1924	4,205	59,400	2,230	560
1925	4,379	56,800	.....	.....
1926	4,972	61,700	.....	.....
1927	6,223	89,100	.....	.....
1928	7,823	103,800	4,840*	1,600

\* Includes only the acreage in the Lower Rio Grande Valley, which is the most important grapefruit producing section in the state. The acreage in the Laredo-Pearsall-Winter Garden section is relatively small.

Sources of data: California from California Cooperative Crop Reporting Service (revised figures). Other states from U. S. Dept. Agr. Bur. Agr. Econ. Market prospects for citrus fruits, 1927-28, p. 2, 1927 (mimeo.) except as follows: 1927 data for Florida from the State Census for 1926-27 as reported in a letter to the writers from Joseph A. Beecher, Bur. Agr. Econ. U. S. Dept. Agr. dated August 3, 1928. This figure is considerably larger than the estimate of H. A. Marks, Agricultural Statistician for Florida, which amounted to 65,900 acres. 1928 data for Florida from State Plant Board of Florida, The Monthly Bulletin, 13(2):25, 1928. This report states "While these figures are the result of an actual count and, therefore, present the most complete and accurate statistics obtainable, it must be borne in mind that the time consumed in completing this state-wide inspection was three years. . . . All trees under four years of age at the time of inspection were reported as non-bearing and those over four years as bearing. While a tree four years old can hardly be classed as full bearing, it must be remembered that trees which were four years old in 1925 and 1926 are six and seven years old at the present time, so that the proportions of bearing and non-bearing trees should prove acceptable."

1924 data for Texas from U. S. Census of Agriculture, 1925, part 2, p. 1206.

1928 data for Texas from U. S. Dept. Agr. Plant Quarantine and Control Administration. Citrus census of the Lower Rio Grande Valley of Texas as of July 1, 1928 (mimeo.).

1928 data for Arizona from C. H. Coulson, Assistant County Agent, Phoenix, Arizona, in letter dated Aug. 4, 1928.

All data except for California were given in number of trees. In Florida the number of trees was converted to acres on the basis of 50 trees per acre; and in Texas and Arizona, on the basis of 70 trees per acre.

Data are not available where omitted.

The changes in the estimated bearing acreage in each of the four states since 1919 are shown in table 1. All of them have experienced a substantial increase, and indications point to a still further increase during the next few years.

In Florida the bearing acreage increased from 33,600 acres in 1919 to 59,400 acres in 1924. The following year there was a slight decline which was probably a result of the real estate boom. Since 1925, however, there has been a phenomenal expansion. In 1926 the bearing acreage amounted to 61,700 acres, and in 1928 to 103,800 acres. According to these figures, therefore, the bearing acreage of grapefruit in Florida has been more than trebled since 1919 and almost doubled since 1924. It is evident that a considerable proportion of the present bearing acreage has not yet reached the age of full bearing and that the full effects of the increase in acreage upon production have not yet been felt.

The present non-bearing acreage in Florida is estimated at about 8,000 acres.<sup>3</sup> We may expect, therefore, a further increase in bearing acreage in Florida during the next few years, although the amount of increase will be small as compared with that of the past few years.

Texas has only recently become an important factor in the grapefruit situation in the United States. In 1919 there were only 80 acres of grapefruit in bearing in Texas. By 1921 the bearing acreage had increased to 2,280 acres and by 1928 to about 5,000 acres. The absolute increase, however, has been small as compared with the probable increase during the next five years. According to a census taken in the summer of 1928, there were 29,500 acres of non-bearing grapefruit trees in the Lower Rio Grande Valley, which is the principal grapefruit producing section in Texas.<sup>4</sup> The census also reported the age distribution of the young trees. Of the 29,500 acres not in bearing in 1928, 45 per cent were planted in 1927-28; 22 per cent in 1926-27; 14 per cent in 1925-26; 12 per cent in 1924-25; and 7 per cent in 1923-24. There is also a relatively small acreage of grapefruit in the Laredo-Pearsall-Winter Garden section, most of which has been planted in the past three years.<sup>5</sup>

The bearing acreage of grapefruit in Arizona increased from 270 acres in 1919 to 1,600 acres in 1926. The present non-bearing acreage

<sup>3</sup> State Plant Board of Florida, *The Monthly Bulletin*. 13(2):25. 1928.

<sup>4</sup> U. S. Dept. Agr. Plant Quarantine and Control Administration. *Citrus Census of the Lower Rio Grande Valley of Texas as of July 1, 1928* (mimeo.). The census reported the number of trees which were converted to acres on the basis of 70 trees per acre. All trees less than five years of age were classed as non-bearing.

<sup>5</sup> U. S. Dept. Agr. Bur. Agr. Econ. *Market prospects for citrus fruits, 1927-28*, p. 9 (mimeo.). 1927.

in that state is estimated to be 2,200 acres.<sup>6</sup> It appears, therefore, that the bearing acreage in Arizona may be more than doubled within the next five years. Most of the recent plantings in Arizona have been made in the Salt River Valley. Only a very small part of that district that is suitable to grapefruit has been planted, however, according to C. H. Coulson, Assistant County Agent at Phoenix. Several large projects have recently been organized in the Salt River Valley upon which it is intended to plant grapefruit. According to

BEARING ACREAGE OF GRAPEFRUIT IN CALIFORNIA, 1914-1928

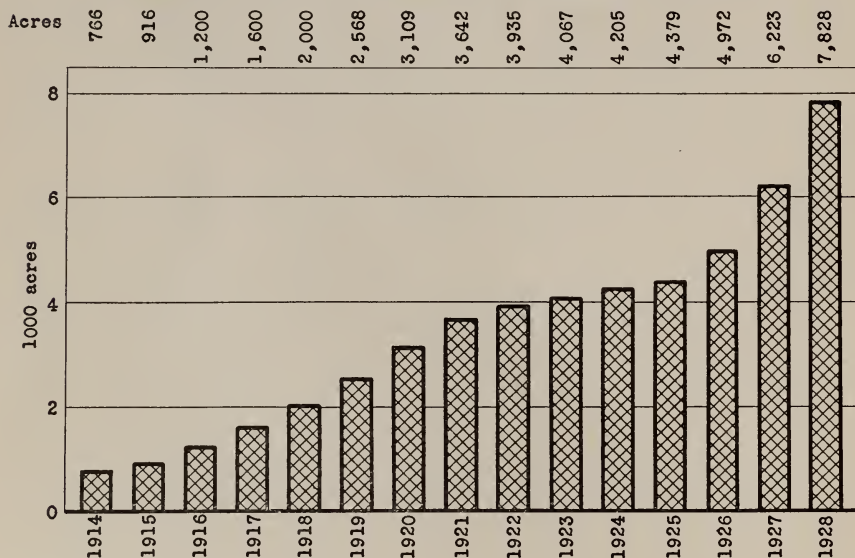


Fig. 1.—There has been a substantial increase in the bearing acreage of grapefruit in California during recent years.

(Data from California Cooperative Crop Reporting Service.)

Professor Robert W. Hodgson, Division of Subtropical Horticulture, University of California, the principal limiting factor at the present time is the shortage of trees.<sup>7</sup> As the nursery stock becomes available it may be expected that the acreage planted to grapefruit will be greatly expanded.

In California, estimates of bearing acreage are available for each year since 1914. These data are shown graphically in figure 1. During the first eight years of the period the bearing acreage in-

<sup>6</sup> Coulson, C. H., Assistant County Agent, Phoenix, Arizona, in letter to the writers dated August 4, 1928.

<sup>7</sup> Shipment of citrus trees into Arizona is prohibited by quarantine regulations, and consequently it is necessary to grow the trees within the state.



creased rapidly and continuously, rising from 766 acres in 1914 to 3,935 acres in 1922. During the three years following 1922 the increase was relatively small. Then occurred a period of very rapid expansion which has not yet ended. From 1925 to 1928 the bearing acreage was increased by 3,449 acres, which is only 164 acres less than the total increase during the previous ten years.

The present non-bearing acreage of grapefruit in California, including 1927 plantings, amounts to 4,596 acres. This indicates that there will be a considerable increase in bearing acreage during the next few years.

TABLE 2  
GRAPEFRUIT ACREAGE BY COUNTIES IN CALIFORNIA, 1921-1928

County	Bearing acreage								Non-bearing acreage* 1928
	1921	1922	1923	1924	1925	1926	1927	1928	
Butte.....	16	16	16	16	15	10	11		
Colusa.....	25	25	25	25	25	25	25	25	
Glenn.....		8	14	20	20	20	20	21	
Sacramento.....	33	33	34	40	40	40	40	40	
Fresno.....	5	5	5	5	10	10	10	10	
Kern.....	23	23	23	23	24	24	24	12	23
Tulare.....	1,145	1,171	1,171	1,172	1,175	1,175	1,177	1,181	4
Imperial.....	120	230	340	450	500	1,038	2,289	3,679	2,500
Los Angeles.....	363	378	378	378	475	484	517	512	46
Orange.....	50	57	60	63	85	112	42	93	51
Riverside.....	415	431	442	453	450	474	464	559†	433†
San Bernardino.....	1,390	1,500	1,500	1,500	1,500	1,500	1,543	1,543	26
San Diego.....	42	42	42	42	42	42	43	135	32
Santa Barbara.....	5	6	7	8	8	8	8	8	
Ventura.....	10	10	10	10	10	10	10	10	3
Total.....	3,642	3,935	4,067	4,205	4,379	4,972	6,223	7,828	3,118

\* 1927 Plantings of 1,478 acres not included.

† According to A. E. Bottel, Horticultural Commissioner, Riverside County, 132 of the 559 bearing acres and 418 of the 433 non-bearing acres in Riverside County in 1928 were in the Coachella Valley, which is contiguous to the Imperial Valley.

Source of data: Compiled by N. I. Nielsen, Fruit Statistician, California Cooperative Crop Reporting Service.

*Grapefruit Acreage by Counties in California.*—The principal grapefruit-producing counties of the state in order of their importance are Imperial, San Bernardino, Tulare, Riverside, and Los Angeles. In 1928 these five counties contained 96 per cent of the total bearing acreage in the state, and Imperial County alone contained 47 per cent.

The changes in the bearing acreage of grapefruit in the various counties of the state from 1921 to 1928 are shown in table 2. It will be noted that Imperial County has experienced a phenomenal expan-

sion. In 1921 there were only 120 acres of grapefruit in bearing in that county; in 1928 there were 3,679 acres in bearing. Approximately 85 per cent of the total increase in the bearing acreage in California from 1921 to 1928 was in this one county. Each of the other four important grapefruit-producing counties has experienced only a small increase in bearing acreage.

The last column in table 2, which gives the non-bearing acreage by counties, shows the location of recent plantings of grapefruit. Only two counties, Imperial and Riverside, have a sufficiently large non-bearing acreage to be of significance. Of the 3,118 acres of grapefruit not in bearing in 1928, exclusive of 1927 plantings, 80 per cent were in Imperial County and 14 per cent in Riverside County. Practically all of the present non-bearing acreage in Riverside County is in the Coachella Valley which is really a part of the Imperial Valley basin.

#### CARLOT SHIPMENTS<sup>8</sup>

*Trend of Shipments.*—The carlot shipments of grapefruit in the United States from 1920–21 to 1927–28 are shown in figure 2. During the first part of this period there was a pronounced upward trend in shipments. In 1920–21 shipments amounted to 11,626 cars; by 1924–25 they had risen to 21,202 cars, an increase of 82 per cent in four years. During the past three years shipments have fluctuated about a level considerably below that of 1923–24 and 1924–25. This situation, however, is only temporary. The upward trend of shipments such as prevailed between 1920–21 and 1924–25 is likely to be resumed during the coming years.

The lower level of shipments during the past three years has been largely a result of unfavorable conditions in Florida. Because of the dominant position of that state in the grapefruit industry, anything which affects production there has a very pronounced influence upon the entire national production. The small crop in Florida in 1925–26 was largely a result of neglect arising out of the real estate boom in that state. During the boom large acreages of grapefruit were subdivided. Some orchards were actually taken out (see table 1). Many others were not properly cared for, and in particular, no fertilizer was applied. Consequently the yields were greatly reduced. By 1926–27 the real estate boom had subsided, and the orchards were being brought back into bearing. In that year, however, the crop was damaged by a severe freeze, a hurricane, and a drought. The

<sup>8</sup> Data on carlot shipments do not include mixed car, boat, or truck shipments.

1927-28 crop is even smaller than the 1926-27 crop. The drought which affected last year's crop has continued, and in addition there was another severe freeze in Florida the early part of 1928.

These unfavorable conditions, however, cannot normally be expected to continue. The freezes in 1927 and 1928 were the most severe since 1917, and the drought was the most severe that has occurred in a half-century. With reasonably favorable conditions in Florida during the next few years, the yield per acre is likely to be much larger. The bearing acreage has increased steadily since 1925,

CARLOT SHIPMENTS OF GRAPEFRUIT, UNITED STATES, 1920-21 TO 1926-27

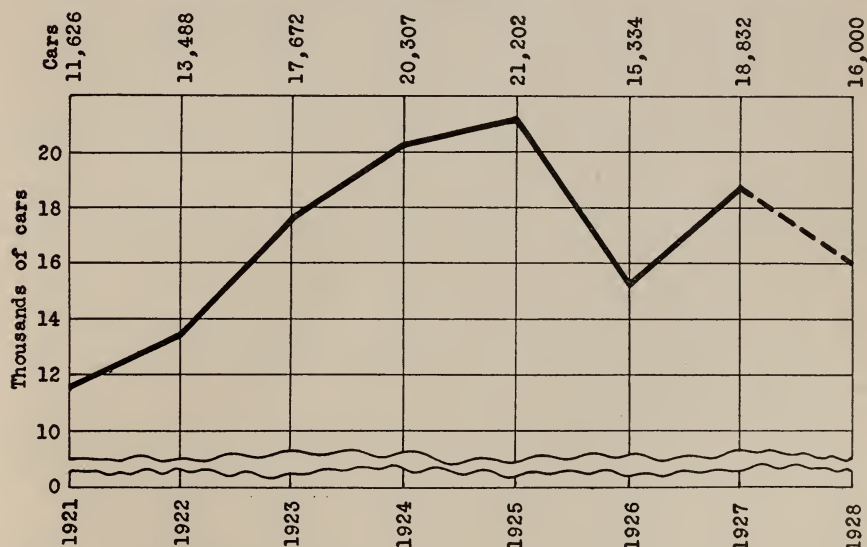


Fig. 2.—Carlot shipments of grapefruit increased rapidly from 1920-21 to 1924-25, but since then they have been below normal.

(Data from table 3. 1928 figure subject to revision.)

and indications point to a still further increase in the near future. Furthermore, many of the orchards have not yet reached the age of full bearing so that there is likely to be some increase in the yield per acre as a result of the increase in the average age of the trees. On the other hand, a part of the increase in yield per acre may be offset if some of the recent plantings have been made in areas less adapted to high production. Information on this point, however, is not available.

Texas, Arizona, and California have also experienced an increase in carlot shipments of grapefruit during recent years although the actual increases in numbers of cars have been small as compared with

the increase in Florida. Texas first began to ship grapefruit in carlots in 1921-22, when eight cars were shipped. From this small beginning only seven years ago, shipments increased to over 1,000 cars in 1927-28 (table 3), and it is evident from the reports on plantings in Texas that the shipments this year are only a fraction of what is likely to be shipped from that state in the coming years.

In Arizona shipments increased steadily from 48 cars in 1920-21 to 218 cars in 1925-26. Since then shipments have been slightly smaller. It is not likely, however, that the peak of shipments in

TABLE 3

CARLOT SHIPMENTS OF GRAPEFRUIT BY STATES OF ORIGIN, 1919-20 TO 1926-27

State	Crop-movement season*							October to June 1927-28†
	1920-21	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	
	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>
California.....	463	475	552	439	435	549	603†	555
Florida.....	11,115	12,943	16,969	19,614	20,087	14,269	17,272	13,874
Texas.....		8	48	99	521	298	747	1,013
Arizona.....	48	62	103	155	159	218	210	194
Total.....	11,626	13,488	17,672	20,307	21,202	15,334	18,832†	15,636

\* In Arizona and Florida the crop-movement season begins September 1, and in California and Texas it begins October 1.

† Preliminary—subject to revision.

Sources of data: U. S. Dept. Agr. Yearbook of Agriculture, 1927:843, 1928, except for California, which are from table 4. October to June 1927-28 figures from U. S. Dept. Agr. Bur. Agr. Econ. Crops and Markets, monthly issues.

Arizona has been reached. The smaller shipments last year and this year as compared with 1925-26 appear to be a temporary and not a permanent interruption of the previous upward trend.

Carlot shipments of grapefruit in California amounted to 463 cars in 1920-21 as against 603 cars in 1926-27. Practically all of this increase originated in the Imperial Valley (table 4). In 1920-21 shipments from the Imperial Valley amounted to only 16 cars, or less than 4 per cent of the total shipments. By 1926-27 they had increased to 147 cars, which was almost 25 per cent of the total shipments. Although the shipments from Imperial Valley are still smaller than those from the central and southern districts,<sup>9</sup> this situation is

<sup>9</sup> The Imperial Valley district includes Imperial County and the Coachella Valley in Riverside County; the southern district, the counties south of the Tehachapi with the exception of Imperial County and the Coachella Valley in Riverside County; the central district, the San Joaquin Valley counties; and the northern district, the Sacramento Valley counties.



not likely to continue. There has been practically no increase in shipments from the two latter districts during the past six years, nor is there likely to be any material increase during the next few years. There has been no recent expansion in grapefruit acreage in either the southern or the central districts. On the other hand, there has been a very rapid expansion in the Imperial Valley. As a result, that valley is soon likely to become the most important grapefruit-producing district in the state.

TABLE 4  
CARLOT SHIPMENTS OF GRAPEFRUIT BY DISTRICTS IN CALIFORNIA,  
1920-21 TO 1926-27

District	Crop-movement season, October to September						
	1920-21	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27*
	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>
Northern.....	1			1			7
Central.....	209	226	222	197	213	240	177
Southern.....	237	212	278	163	164	212	272
Imperial Valley.....	16	37	52	78	58	97	147
Total.....	463	475	552	439	435	549	603

\* Preliminary—subject to revision.

Sources of data: Compiled from U. S. Dept. Agr. Bur. Agr. Econ., unpublished data (revised), except for 9 months of January to September, 1927, which were compiled from: Yoeman, Opal V. Summary of carlot shipments of important fruits and vegetables in California, Arizona, and Nevada, 1927. U. S. Dept. Agr. Bur. Agr. Econ. mimeographed circular, 1928.

*Seasonal Variation in Shipments.*—The average seasonal movement of total carlot shipments of grapefruit in the United States is shown in figure 3. Although some grapefruit is shipped every month in the year, the bulk of the crop moves to market during the eight months of October to May. During the five years of 1922-23 to 1926-27, almost 96 per cent of the total carlot shipments have been shipped in this period. The peak of shipments usually comes in March. This peak, however, is not materially higher than the shipments in either November, January, February, or April. After May, shipments decline rapidly, reaching a low point in August. During each of the three months of July, August, and September, shipments have averaged less than 175 cars a month; whereas the shipments in March have averaged almost 2,800 cars.

The time of the year that each of the four important producing states ship grapefruit and the average amount that has been shipped each month during the past five years is shown in table 5.

PERCENTAGE OF TOTAL CARLOT SHIPMENTS OF UNITED STATES GRAPEFRUIT SHIPPED  
BY MONTHS, AVERAGE 1922-23 TO 1926-27

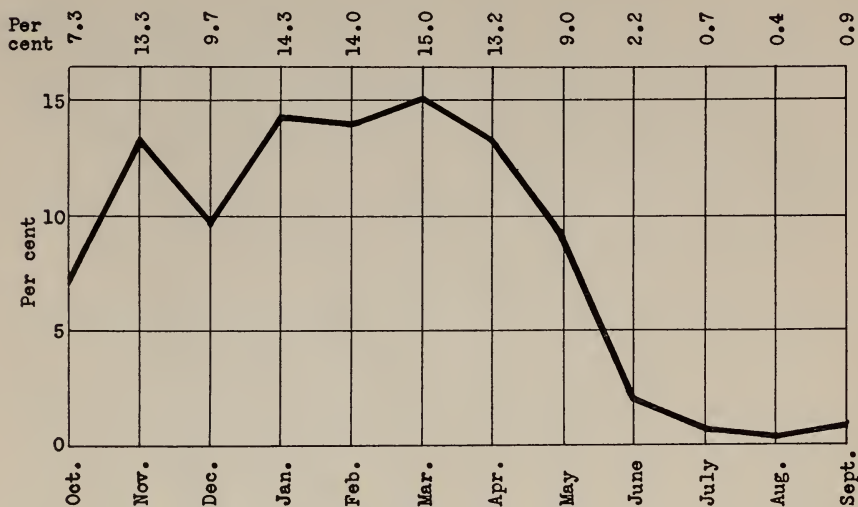


Fig. 3.—Most of the United States grapefruit crop is marketed between  
October and May.

(Data from table 5.)

TABLE 5

MONTHLY CARLOT SHIPMENTS OF GRAPEFRUIT BY STATES OF ORIGIN, AVERAGE  
1922-23 TO 1926-27

Month	Carlot shipments					Percentage shipped each month				
	Calif.	Florida	Texas	Arizona	Total	Calif.	Florida	Texas	Arizona	Total
	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>per cent</i>	<i>per cent</i>	<i>per cent</i>	<i>per cent</i>	<i>per cent</i>
October.....	29	1,285	18	36	1,368	5.6	7.3	5.2	20.9	7.3
November.....	49	2,339	77	21	2,486	9.5	13.3	22.5	12.2	13.3
December.....	50	1,673	69	17	1,809	9.7	9.5	20.1	9.9	9.7
January.....	44	2,532	73	23	2,672	8.6	14.3	21.3	13.4	14.3
February.....	43	2,495	56	25	2,619	8.4	14.1	16.3	14.5	14.0
March.....	53	2,681	31	27	2,792	10.3	15.2	9.0	15.7	15.0
April.....	36	2,395	17	12	2,460	7.0	13.6	5.0	7.0	13.2
May.....	42	1,637	1	7	1,687	8.2	9.3	0.3	4.1	9.0
June.....	41	364	1		406	8.0	2.1	0.3		2.2
July.....	54	71			125	10.5	0.4			0.7
August.....	49	20			69	9.5	0.1			0.4
September.....	24	146		4	174	4.7	0.8		2.3	0.9
Total.....	514	17,638	343	172	18,667	100.0	100.0	100.0	100.0	100.0

Source of data: Compiled from table 15.

The seasonal movement of Florida's grapefruit shipments conforms fairly closely to the curve of total United States shipments shown in figure 3. The new crop in Florida begins to move in September but does not get well under way until October. Shipments increase very rapidly during October and November. There is usually some decline in shipments in December, but during each of the four months of January to April shipments are generally larger than in November. The peak of shipments generally comes in March. By the end of June the season is practically ended.

The shipping season in Arizona begins in September and ends in May. The heaviest shipping months in Arizona are October, January, February, and March. Approximately 65 per cent of the total crop is shipped during these four months, and almost 21 per cent of the total in the one month of October.

TABLE 6

MONTHLY CARLOT SHIPMENTS OF GRAPEFRUIT, CALIFORNIA BY DISTRICTS,  
AVERAGE 1922-23 TO 1926-27

Month	Carlot shipments				Percentage shipped each month			
	Central district	Imperial Valley	Southern district	Total	Central district	Imperial Valley	Southern district	Total
	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>per cent</i>	<i>per cent</i>	<i>per cent</i>	<i>per cent</i>
October.....	24	2	3	29	11.4	2.3	1.4	5.6
November.....	29	19	1	49	13.8	22.1	.4	9.5
December.....	30	18	2	50	14.3	20.9	.9	9.7
January.....	28	15	1	44	13.3	17.4	.4	8.6
February.....	27	13	3	43	12.9	15.2	1.4	8.4
March.....	28	15	10	53	13.3	17.4	4.6	10.3
April.....	16	3	17	36	7.6	3.5	7.8	7.0
May.....	12	1	29	42	5.7	1.2	13.3	8.2
June.....	6		35	41	2.9		16.1	8.0
July.....	1		53	54	.5		24.3	10.5
August.....	3		46	49	1.4		21.1	9.5
September.....	6		18	24	2.9		8.3	4.7
Total.....	210	86	218	514	100.0	100.0	100.0	100.0

Source of data: Compiled from table 16.

In Texas the shipping season begins in October and is practically ended by the last of April. The peak of shipments in Texas comes in November, although the shipments in December and January are almost as large as in November.

As contrasted with the situation in Florida, Arizona, and Texas, the monthly carlot shipments of grapefruit from California are fairly uniform throughout the entire year. While our grapefruit meets with intense competition during the months of October to May from

that grown elsewhere in the United States, the competition from June to September is much less.

Practically all of the California shipments during the four months of June to September originate in the southern district. This district ships the bulk of its grapefruit in the spring and summer months (table 6). The Imperial Valley and the central district, on the other hand, ship practically no grapefruit in the summer. The shipping season in the Imperial Valley begins in October and is ended in May. The heaviest shipments are from November to March. In the central district the new crop usually begins to move the latter part of September and continues into June. Approximately 80 per cent of it, however, is shipped during the six months of October to March.

### IMPORTANT MARKETS

Grapefruit is widely distributed throughout the markets of the United States. According to figures collected by the Bureau of Agricultural Economics of the United States Department of Agriculture, Florida grapefruit was shipped in carlots to 407 cities located in 45 states of the Union and to 16 cities in Canada during the 1926-27 season. Shipments from the other producing states are of course much less widely distributed because of the relatively small total production.

The carlot unloads of grapefruit in 38 important cities of the United States during the calendar year of 1927 are shown in table 7. The two most important markets for California grapefruit are San Francisco and Los Angeles. In 1927 these two cities took two-thirds of California's total carlot shipments. In addition to the carlot receipts in Los Angeles, heavy supplies were received by truck from the nearby producing sections. The volume of truck receipts, however, is not available.

Shipments of California grapefruit to eastern markets occur mainly during the summer months. At that time of the year there are practically no shipments from the other grapefruit producing states, and the high prices in the eastern markets resulting from the short supplies enable California growers to pay the transportation costs necessary to reach those markets. In the winter months, however, the eastern markets are largely supplied with grapefruit from Florida and Texas. Those two states are closer to the eastern markets than California. Consequently, it is difficult for us to compete with them there. On the other hand, California is in a more favorable



position in the markets west of the Rocky Mountains. This area appears to be the logical market for our winter grapefruit.

Even in this area, however, our winter grapefruit does not escape competition. The markets west of the Rocky Mountains and particularly the markets in California are more accessible to Arizona than are the markets in the eastern states. In 1927 Arizona unloaded

TABLE 7  
GRAPEFRUIT UNLOADS IN 38 CITIES BY STATES OF ORIGIN, 1927

City	Origin of unloads						Total
	California	Florida	Texas	Arizona	Unknown	Imports	
	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>
Atlanta, Ga.....		213				3	216
Baltimore, Md.....		311				18	329
Boston, Mass.....	52	1,120	1		17	81	1,271
Buffalo, N. Y.....	7	241			1	4	253
Chicago, Ill.....	16	1,706	4			16	1,742
Cincinnati, Ohio.....		272				1	273
Cleveland, Ohio.....		488		1	1	12	502
Columbus, Ohio.....		213			2	1	216
Dallas, Texas.....	6	43	63	4			116
Denver, Colo.....		136	65	1		2	204
Des Moines, Ia.....	4	45	43		4	1	97
Detroit, Mich.....	1	624	3			33	661
Fort Worth, Texas.....	7	19	46	2			74
Hartford, Conn.....		116					116
Houston, Texas.....	7	37	42	1			87
Indianapolis, Ind.....		217				6	223
Jacksonville, Fla.....		394					394
Kansas City, Mo.....	1	248	28	3		6	286
Los Angeles, Calif.....	104			61		1	166
Louisville, Ky.....		103					103
Memphis, Tenn.....		142	3		1	2	148
Milwaukee, Wis.....		167	7		1		175
Minneapolis, Minn.....		187	44				231
New York, N. Y.....	12	3,106				2,219	5,337
Oklahoma, Okla.....	3	49	29				81
Omaha, Nebr.....	1	90	22				113
Philadelphia, Pa.....	2	974				78	1,054
Pittsburgh, Pa.....		385				4	389
Portland, Ore.....	11	141	1	8		1	162
Rochester, N. Y.....	4	153					157
San Francisco, Calif.....	306			55			361
Seattle, Wash.....	35	174	5		2		216
Sioux City, Ia.....	1	45	13		3		62
Spokane, Wash.....	1	40			4		45
St. Louis, Mo.....		291	2			5	298
St. Paul, Minn.....		115	13				128
Toledo, Ohio.....		123				4	127
Washington, D. C.....		272				3	275
Total.....	581	13,000	434	136	36	2,501	16,688

Source of data: Bureau of Railway Economics, Unloads of Fresh Fruits and Vegetables at Sixty-six Important Consuming Markets in the United States. Bul. 31:13, July, 1928.

61 cars of grapefruit in Los Angeles and 55 cars in San Francisco out of a total shipment of 263 cars. Although grapefruit produced in Florida and Texas cannot be shipped into California because of quarantine regulations, it does compete directly with out grapefruit in the markets of the northwest. Last year, for example, 174 cars of Florida grapefruit were unloaded in Seattle and 141 cars in Portland.

### CONSUMPTION

There has been a pronounced upward trend in the consumption of grapefruit in the United States. The changes in the estimated per capita consumption of the fresh fruit in the United States from 1918-19 to 1926-27 are shown in figure 4. During the first five years

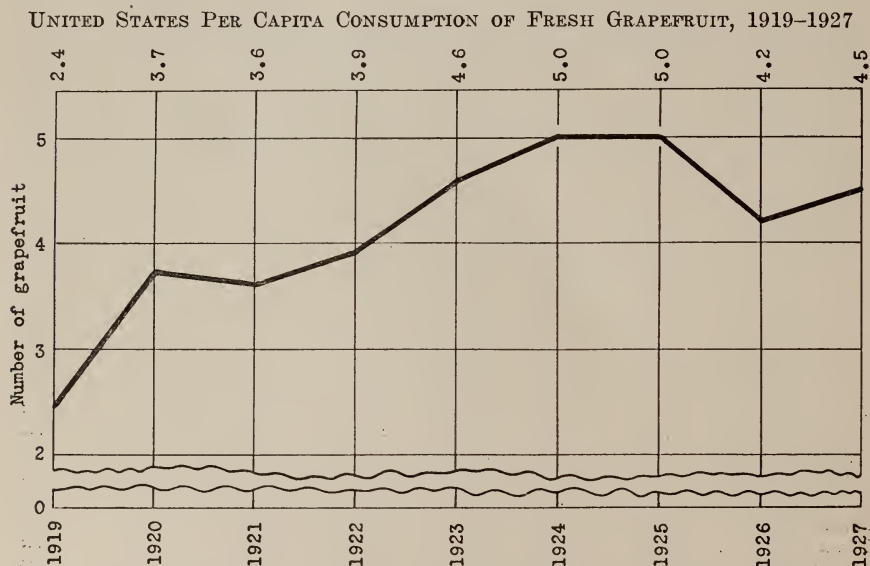


Fig. 4.—There has been a pronounced upward trend in the per capita consumption of grapefruit in the United States.

(Data from table 9.)

of this period the increase in per capita consumption was very large. In 1918-19 the average person in this country ate 2.4 grapefruits; the following year, 3.7 grapefruits; and in 1923-24, 5.0 grapefruits. It is particularly significant that this large increase in per capita consumption occurred in the absence of a decline in prices. It means that there was a real increase in the demand for grapefruit.

During the two years of 1925-26 and 1926-27 the per capita consumption has amounted to only 4.4 grapefruits on the average,

which is 12 per cent less than the amount consumed in 1923-24. The decline in per capita consumption, however, was more than offset by an increase in prices. Although people bought 12 per cent fewer grapefruits these past two years than they did in 1923-24, they paid 25 per cent more for each grapefruit they did buy. This indicates that the increase in the demand for grapefruit, which was so readily apparent between 1918-19 and 1923-24, has continued.

### CANNED GRAPEFRUIT

The utilization of grapefruit in canning has only recently become of commercial importance. According to Professor Robert W. Hodgson, Division of Subtropical Horticulture, University of California, who has made a study of the situation in Florida, commercially successful methods of canning grapefruit have been developed, and the product has been favorably received in the markets. The canning industry in Florida has only recently been established, and in the past few years it has been handicapped by short supplies and high prices of fresh grapefruit. Nevertheless, a substantial growth has been made. The Biennial Census of Manufactures reports the canned grapefruit pack in 1923 as about 200,000 cases. In 1926-27 it had increased to about 600,000 cases.<sup>10</sup>

In addition to the pack in Florida, relatively large supplies of canned grapefruit are received from Porto Rico, and the receipts from Porto Rico have been increasing rapidly (table 10).

Canned grapefruit offers a promising outlet for a part, but only a part, of the probable increase in the nation's production. By canning it is possible to extend throughout the entire year the marketing season of the large grapefruit producing states. Canning also offers an outlet for fruit which is blemished and unattractive. With the limited experience that is available it is impossible to determine just how much effect the development of canning will have upon the grapefruit industry. It does not appear reasonable, however, to expect that it will provide an outlet at the present level of prices for more than a part of the probable increase in production. It must be recognized that the canned product comes in direct competition with the fresh product during the time when the fresh product is being marketed. Consequently, the price that can be obtained for canned grapefruit is affected by the price which consumers will pay for fresh grapefruit.

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<sup>10</sup> U. S. Dept. Agr. Yearbook of Agriculture 1927. p. 183, 1928.

A large increase in the pack of canned grapefruit is likely to affect adversely the prices received by California growers who market their grapefruit during the summer months. As it is now, California summer grapefruit meets with practically no competition from that grown in other sections. But if the canned pack is greatly increased in will probably result in considerable competition to our summer fruit.

RELATIVE PRICES OF GRAPEFRUIT F.O.B. CALIFORNIA (AVERAGE 1912-1915=100)  
AND ALL COMMODITY INDEX OF WHOLESALE PRICES (AVERAGE 1910-1914=100)

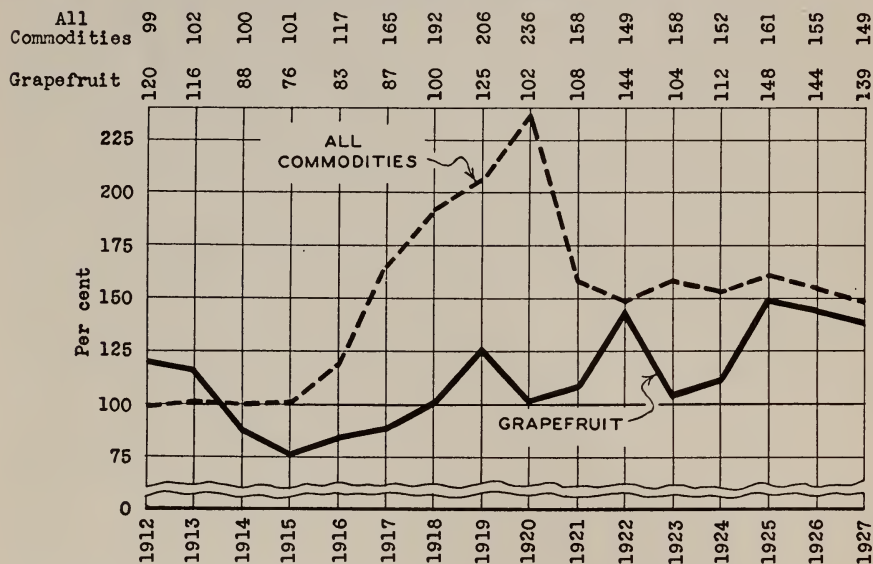


Fig. 5.—Grapefruit prices have been maintained at a relatively high level during the past three years.

(Data from table 18.)

## PRICES

*Trend of Prices.*—The relative prices of grapefruit f.o.b. California expressed as percentages of the average price from 1912 to 1915 are shown by the solid line in figure 5. Since 1915 there has been a pronounced upward trend in prices. The rise in price from 1915 to 1920, however, was more than offset by the increase in the general price level of all commodities,<sup>11</sup> which is represented by the broken line. On the other hand there has been practically no change in the general price level during the past seven years; while there has been

<sup>11</sup> The Bureau of Labor Statistics all commodity index of wholesale prices in the United States is used to measure changes in the general price level.



a substantial increase in the price of grapefruit. The three years from 1925 to 1927 have apparently been the most prosperous three-year period which the grapefruit industry of California has had in the last fourteen years.

*Factors Affecting Prices.*—The relation between the average annual price and carlot shipments of California grapefruit is shown in figure 6. The tendency is for large shipments to be accompanied by low prices and small shipments by high prices. The lack of a

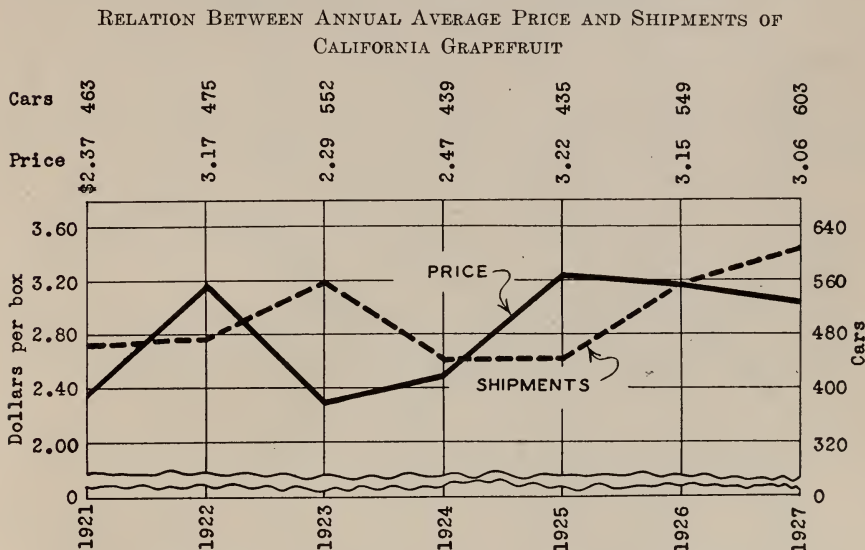


Fig. 6.—One factor affecting the price of California grapefruit is the volume of shipments from the state.

(Data from tables 3 and 18.)

closer relationship is in part a result of competition of grapefruit produced in other areas. During the winter and spring months, California grapefruit meets with considerable competition from grapefruit grown in other states. Consequently the prices of our grapefruit are affected by the volume of these other shipments as well as by the size of our crop. As a result of the competition, the prices of grapefruit from the several producing states tend to move together. For example, the fluctuations in the yearly average prices of California and Florida grapefruit are generally, although not always, in the same direction.

The volume of competing fruits on the markets also has an important effect upon the price of grapefruit. Oranges are probably the most important single competitor of grapefruit. The effect of

the size of the winter orange crop upon the prices of Florida grapefruit<sup>12</sup> is shown in figure 7. The solid line represents the average annual prices of Florida grapefruit; the broken line, the total shipments of winter oranges. Each curve is plotted in percentages of its trend. It is readily apparent that a high degree of association has existed between these two series. When the winter orange crop has been large, prices of Florida grapefruit have been low, and conversely

RELATION BETWEEN THE PRICES OF FLORIDA GRAPEFRUIT AND THE UNITED STATES SHIPMENTS OF WINTER ORANGES, 1924-1927

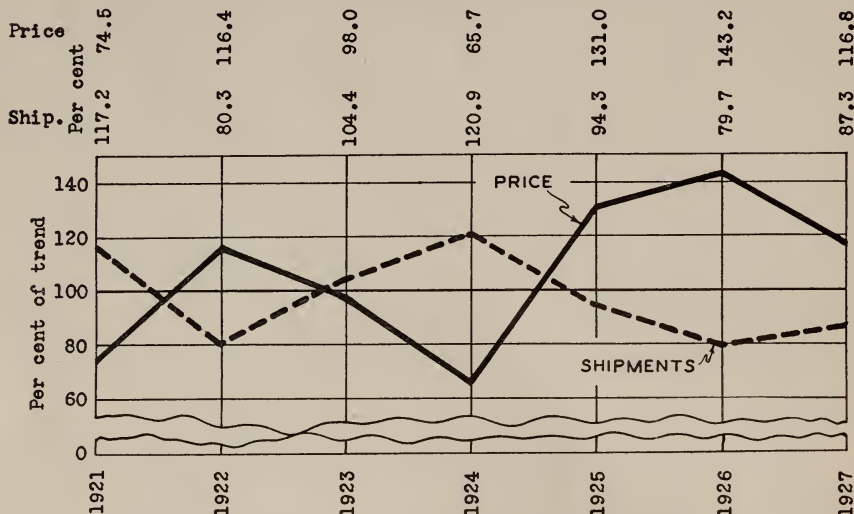


Fig. 7.—The size of the winter orange crop has an important effect upon the prices of grapefruit.

(Data compiled from table 8.)

when the winter orange crop has been small, prices of Florida grapefruit have been high.

In fact, during the period shown in figure 7, prices of Florida grapefruit have responded much more promptly to changes in the supply of winter oranges than to changes in the supply of grapefruit. This situation can largely be accounted for by two conditions. In the first place there was a rapid continual increase in the shipments of grapefruit from 1920 to 1924. Each year the shipments were

<sup>12</sup> Prices of Florida grapefruit rather than the prices of California grapefruit were used in figure 7 for two reasons: In the first place the Florida grapefruit crop is very much larger than the California grapefruit crop, and consequently the prices of Florida grapefruit are the more representative. In the second place, all of the Florida grapefruit crop is shipped at practically the same time as the winter orange crop while a considerable part of the California grapefruit crop is shipped during the summer months.

larger than in the preceding year. Consequently the actual shipments conformed very closely to the trend of shipments. In the second place the winter orange crop is four times as large as the grapefruit crop. Since the two commodities are very close competitors, the crop that is the larger tends to exert the dominant influence on the price. The relationship between Florida grapefruit prices and winter orange shipments may not be as close in the future as it has been in the past, however. With the large increase in grapefruit shipments, it is likely that they, rather than winter orange shipments, will have the dominant influence on grapefruit prices.

TABLE 8

PRICES OF GRAPEFRUIT F.O.B. TAMPA, FLORIDA, AND UNITED STATES SHIPMENTS OF WINTER ORANGES, 1920-21 TO 1926-27

Crop year ending in	Prices of Florida grapefruit	Shipments of winter oranges
	1	2
	<i>dollars per box</i>	<i>1000 boxes</i>
1921	2.57	18,994
1922	3.77	13,896
1923	2.96	19,619
1924	1.86	24,432
1925	3.51	20,272
1926	3.58	18,327
1927	2.78	21,382

Sources of data:

Column 1. Weighted average prices received by the Florida Citrus Exchange f.o.b. Tampa, Florida. Obtained by the writers from the California Fruit Growers Exchange.

Column 2. Wellman, H. R., and E. W. Braun. Oranges: series on California crops and prices. California Agr. Exp. Sta. Bul. 457:34. 1928.

The high prices of grapefruit which have prevailed since 1925 have been a result of abnormally low supplies of both grapefruit and winter oranges. Attention has already been called to the reasons why the supplies of grapefruit have been low. The same conditions causing the low grapefruit crops were responsible for the low orange crops in Florida. Since these conditions are not likely to continue during the coming years, the competition from Florida grapefruit and oranges is likely to be very much keener in the future than it has been since 1925. Furthermore, the increasing production in Texas, Arizona, and California will probably add considerably to the total supplies of grapefruit to be marketed during the winter and spring months. In view of these developments, it is evident that the

demand for grapefruit will have to be increased very much faster in the future than it has been in the past if prices are to be maintained at the present high level.

*Seasonal Variation in Prices.*—The solid line in figure 8 represents the average seasonal variation in grapefruit prices during the past six years. It will be noted that prices are relatively high on the average at the beginning of the crop year in October. Then follows

SEASONAL VARIATION IN GRAPEFRUIT PRICES F.O.B. CALIFORNIA, AVERAGE 1920-21 TO 1926-27; ANNUAL 1925-26 AND 1926-27

Average 1922-1927	112	98	88	80	89	92	97	97	107	106	114	121
1925-26	121	92	88	75	81	88	102	98	103	106	121	126
1926-27	114	105	93	82	92	95	98	98	103	108	103	109

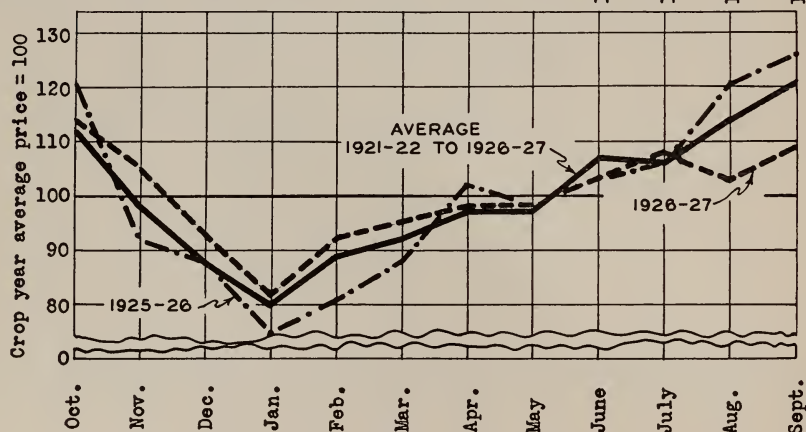


Fig. 8.—The prices of California grapefruit are usually higher in the summer and fall than in the winter and spring.

(Data compiled from table 19.)

a pronounced decline which reaches a low point in January. After January, prices begin to rise and continue irregularly upward during the remainder of the season. During the past six years the prices of grapefruit from June to September have averaged 12 per cent higher, and the prices from November to March, 11 per cent lower than the average prices for the year. One reason why prices are higher in the summer is that only a very small supply of grapefruit is available for shipment at that time. Another reason is that the supply of oranges in the markets is relatively light.



## UNITED STATES FOREIGN TRADE

*Imports.*—During the five years of 1922–23 to 1926–27 the United States imported an average of 900,000 boxes of fresh grapefruit a year (table 9). Of this amount, 72 per cent was from Porto Rico and 28 per cent from Cuba. Imports of fresh grapefruit from Porto Rico have doubled during the past eight years. In 1918–19 they amounted to 375,000 boxes, in 1926–27 to 748,000 boxes.

TABLE 9

UNITED STATES PRODUCTION, IMPORTS, EXPORTS, AND PER CAPITA CONSUMPTION OF FRESH GRAPEFRUIT, 1918–19 TO 1926–27

(Boxes of 60 pounds net.)

Crop year ending in	U. S. production	General imports	Shipments from Porto Rico	Domestic exports	Total supply	Per capita con- sumption
	1	2	3	4	5	6
	<i>1000 boxes</i>	<i>1000 boxes</i>	<i>1000 boxes</i>	<i>1000 boxes</i>	<i>1000 boxes</i>	<i>grapefruits</i>
1919.....	3,511		375		3,886	2.4
1920.....	5,763		413		6,176	3.7
1921.....	5,423		683		6,106	3.6
1922.....	6,305		377		6,682	3.9
1923.....	7,564	299	462	260	8,065	4.6
1924.....	8,344	208	719	305	8,966	5.0
1925.....	8,714	243	518	430	9,045	5.0
1926.....	7,034	252	815	405	7,696	4.2
1927.....	7,731	236	748	625	8,090	4.5

## Sources of data:

Column 1. From table 17.

Columns 2 and 4. U. S. Dept. Commerce, Monthly Summary of Foreign Commerce of the United States, monthly issues. Crop year September to August.

Column 3. Years 1918–19 to 1920–21, U. S. Dept. Commerce, Monthly Summary of Foreign Commerce of the United States, monthly issues. Years 1921–22 to 1926–27, U. S. Dept. Commerce, Bureau of Foreign and Domestic Commerce, by correspondence. Crop year, September to August.

Column 5. United States production plus imports minus exports.

Column 6. Supplies available for consumption converted to number of grapefruit on the basis of 64 grapefruits per box and divided by the mid-year estimates of population of the United States as reported in the Statistical Abstract of the United States.

According to unofficial reports much damage was done to the 1928–29 citrus crop by the hurricane which swept over Porto Rico on September 13, 1928. The extent to which the trees themselves were damaged, however, has not been reported.

The plantings of grapefruit in Porto Rico have been fairly heavy during recent years. Of the 299,000 trees on the island in 1926, 78,000, or 26 per cent, were not in bearing.<sup>13</sup>

In addition to fresh grapefruit, considerable quantities of canned grapefruit are received from Porto Rico, and these imports have also increased rapidly, particularly during the past two years (table 10). During each of the two years 1923-24 and 1924-25 they amounted to less than four million pounds; in 1925-26 they amounted to over six million pounds; and in 1926-27 to almost ten million pounds.

TABLE 10

UNITED STATES RECEIPTS OF CANNED GRAPEFRUIT FROM PORTO RICO, BY MONTHS,  
SEPTEMBER, 1923 TO AUGUST, 1927

Month	1923-24	1924-25	1925-26	1926-27
	<i>1000 pounds</i>	<i>1000 pounds</i>	<i>1000 pounds</i>	<i>1000 pounds</i>
September.....	10	200		35
October.....	17	103	8	72
November.....	59	47		79
December.....	24	53	113	618
January.....	425	499	1,801	1,136
February.....	670	431	1,611	1,318
March.....	373	510	813	1,465
April.....	510	784	1,180	1,436
May.....	395	416	485	1,582
June.....	609	439	198	1,381
July.....	191	131	70	409
August.....	168	7	70	150
Total.....	3,451	3,620	6,349	9,681

Source of data: U. S. Dept. Commerce, Bur. Foreign and Domestic Commerce, by correspondence.

As contrasted with the rapid increase in imports from Porto Rico, imports from Cuba have shown no definite upward or downward trend during recent years. Nor does it appear likely that there will be any material increase in imports from Cuba during the coming years. Practically all of the Cuban grapefruit is grown on the Isle of Pines. According to Vice-Consul Sheridan Talbott at Nueva Gerona, grapefruit production on the island has never been profitable; considering the original investment. As a result "the total acreage of citrus fruit has been reduced from about 8,000 acres at one time to no more than 1,500 acres at present."<sup>14</sup>

<sup>13</sup> U. S. Dept. Agr. Bur. Agr. Econ., Smaller shipments of Porto Rican grapefruit expected. F. S., CF-30, 1926.

<sup>14</sup> U. S. Dept. Agr. Bur. Agr. Econ. Foreign Crops and Markets 16(6):159. 1928.

The time of the year when fresh grapefruit is received from Porto Rico and Cuba is shown in table 11. It will be noted that although some grapefruit is received from each country every month in the year, the heaviest receipts are in September and October. In the past five years almost one-half of the total imports have come in during these two months.

TABLE 11

UNITED STATES RECEIPTS OF GRAPEFRUIT FROM PORTO RICO AND GENERAL IMPORTS, AVERAGE 1922-23 TO 1926-27

Month	Volume			Percentage		
	Receipts from Porto Rico	General imports	Total	Receipts from Porto Rico	General imports	Total
	<i>boxes</i>	<i>boxes</i>	<i>boxes</i>	<i>per cent</i>	<i>per cent</i>	<i>per cent</i>
September.....	101,857	107,561	209,418	15.6	43.4	23.3
October.....	164,333	72,151	236,484	25.2	29.1	26.3
November.....	50,571	10,165	60,736	7.7	4.1	6.7
December.....	19,553	4,536	24,089	3.0	1.8	2.7
January.....	23,929	3,478	32,407	4.4	1.4	3.6
February.....	27,193	6,295	33,488	4.2	2.5	3.7
March.....	43,428	7,140	50,568	6.7	2.9	5.6
April.....	53,750	7,603	61,353	8.2	3.1	6.8
May.....	55,818	5,171	60,989	8.6	2.1	6.8
June.....	51,664	3,415	55,079	7.9	1.4	6.1
July.....	31,914	2,718	34,632	4.9	1.1	3.8
August.....	23,366	17,634	41,000	3.6	7.1	4.6
Total.....	652,376	247,867	900,243	100.0	100.0	100.0

Sources of data: Compiled from tables 20 and 21.

*Exports.*—The United States exports of grapefruit have increased substantially during the past five years. In 1922-23 they amounted to only 260,000 boxes as against 625,000 boxes in 1926-27, an increase of 365,000 boxes. During the same period imports increased 223,000 boxes. There was, therefore, a net increase in exports over imports, of 142,000 boxes.

Almost one-half of our total exports of grapefruit on the average is shipped during the four months of February to May (table 12). As compared with the total carlot shipments, however, exports are relatively light during the winter and spring months and relatively heavy during the summer months.

The principal markets for United States grapefruit are Canada and the United Kingdom (table 13). Of our total domestic exports of 411,000 boxes during the calendar year of 1926, 55.5 per cent went to Canada and 38.4 per cent to the United Kingdom.

TABLE 12

UNITED STATES DOMESTIC EXPORTS OF GRAPEFRUIT, BY MONTHS, SEPTEMBER, 1922  
TO AUGUST, 1927

Month	1922-23	1923-24	1924-25	1925-26	1926-27	Average 1922-23 to 1926-27	
	<i>boxes</i>	<i>boxes</i>	<i>boxes</i>	<i>boxes</i>	<i>boxes</i>	<i>boxes</i>	<i>per cent</i>
September.....	5,254	11,145	6,722	9,721	19,137	10,396	2.6
October.....	17,425	26,539	17,391	28,443	14,468	20,853	5.2
November.....	18,170	25,205	42,202	31,206	48,839	33,124	8.2
December.....	24,369	24,199	28,116	42,289	35,842	30,963	7.6
January.....	21,488	23,845	36,461	33,295	58,522	34,722	8.6
February.....	27,615	33,438	58,896	38,759	66,030	44,948	11.1
March.....	33,018	40,966	74,167	55,932	90,422	58,900	14.5
April.....	23,964	36,782	67,648	43,817	80,067	50,456	12.5
May.....	49,434	28,855	44,246	36,212	75,798	46,909	11.6
June.....	12,927	28,364	25,235	30,511	69,960	33,399	8.2
July.....	16,302	16,017	16,851	39,478	47,215	27,173	6.7
August.....	9,570	9,885	11,718	14,872	19,143	13,038	3.2
Total.....	259,536	305,240	429,653	404,535	625,443	404,881	100.0

Source of data: U. S. Dept. Commerce, Monthly Summary of Foreign Commerce of the United States, Monthly issues.

There has been a phenomenal increase in the consumption of grapefruit in the United Kingdom. Ten years ago, grapefruit was practically unknown in that country. During recent years it has gained steadily in favor. The total imports of grapefruit into the United Kingdom in 1921 amounted to only 40,038 boxes; by 1927 they had increased to 707,546 boxes (table 14). Even now, however, grapefruit is not widely consumed in that country. The per capita

TABLE 13

UNITED STATES EXPORTS OF GRAPEFRUIT BY COUNTRIES OF DESTINATION,  
1922-1926

Year ending Dec. 31	United Kingdom*	Canada	Other countries	Total
	<i>boxes</i>	<i>boxes</i>	<i>boxes</i>	<i>boxes</i>
1922	10,088	207,233	6,596	223,917
1923	15,195	255,182	11,029	281,406
1924	47,720	249,097	15,766	312,583
1925	141,300	283,190	22,391	446,881
1926	157,580	228,430	25,152	411,162

\* United States domestic exports to the United Kingdom do not agree with the United Kingdom imports from the United States (see table 14). A part of the discrepancy is explained on the basis that some of the grapefruit reported in the British statistics as coming from the United States is actually produced on the Isle of Pines and shipped via New York.

Source of data: U. S. Dept. Commerce, Foreign Commerce and Navigation of the United States, annual numbers.



consumption in 1927 amounted to only 1 grapefruit; whereas the per capita consumption in the United States was 4.5 grapefruits.

United States grapefruit has evidently become firmly established in the British market. During the past six years an increasing proportion of the United Kingdom supplies have come from this country. According to British trade statistics, 83 per cent of the grapefruit imports in 1927 were reported as coming from the United States, as against 49 per cent in 1921. Some of these imports, however, consist of fruit produced on the Isle of Pines which was shipped via New York.

TABLE 14

IMPORTS OF GRAPEFRUIT INTO THE UNITED KINGDOM BY COUNTRY OF ORIGIN,  
1921-1927

(Boxes of 60 pounds net.)

Year ending Dec. 31	United States*	Union of South Africa	British West Indies	Others	Total
	<i>boxes</i>	<i>boxes</i>	<i>boxes</i>	<i>boxes</i>	<i>boxes</i>
1921	20,910	2,847	10,232	6,049	40,038
1922	35,804	11,919	10,330	932	58,985
1923	52,623	14,594	19,690	6,704	93,611
1924	109,304	18,396	18,418	5,766	151,884
1925	233,416	25,476	32,866	21,126	312,884
1926	279,822	24,496	50,734	33,397	388,449
1927	584,866	27,892	55,408	39,380	707,546

\* United Kingdom imports from the United States do not agree with the United States domestic exports to the United Kingdom (see table 13). A part of the discrepancy is explained on the basis that some of the grapefruit reported in the British statistics as coming from the United States is actually produced on the Isle of Pines and shipped via New York.

Sources of data: U. S. Dept. Agr. Bur. Agr. Econ. Second direct shipment of Florida citrus fruit arrives in Liverpool. F.S. CF-53. 1928.

The United Kingdom also receives considerable quantities of grapefruit from the Union of South Africa and the British West Indies. Shipments from both of these countries have steadily increased. It is expected that there will be a further substantial increase in grapefruit shipments from the Union of South Africa during the next few years. In 1927 there were 97,590 grapefruit trees in that country, 84 per cent of which were not yet in bearing.<sup>15</sup>

Although there has been a substantial increase in the United States exports of grapefruit to Canada, it has not been nearly as large as the increase in exports to the United Kingdom. During the two years of 1922 and 1923 our exports to Canada averaged 231,000 boxes a

<sup>15</sup> U. S. Dept. Agr. Bur. Agr. Econ. South African citrus fruit industry shows expansion. F.S. CF-47. 1927.

year as against an average of 256,000 boxes a year during the two years of 1925 and 1926. So far our grapefruit has experienced practically no competition in the Canadian markets. According to the official Canadian statistics, 95 per cent of the total imports of grapefruit into Canada during the year ending March 31, 1927 were from the United States. The remaining 5 per cent were from the British West Indies.<sup>16</sup> During recent months, however, grapefruit from the British West Indies have enjoyed a preferential treatment in the Canadian markets. Under the trade agreement of April 30, 1927, between Canada and the West Indies, grapefruit from the British West Indies is admitted free of duty into Canada if imported by ship direct into a Canadian port. If it is not imported direct, the rate of duty is 50 cents per 100 pounds. On the other hand, grapefruit imported into Canada from the United States is dutiable at the rate of \$1.00 per 100 pounds.<sup>17</sup>

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<sup>16</sup> U. S. Dept. Agr. Bur. Agr. Econ. The Canadian market for citrus fruit. F.S. CF-43, 1927.

<sup>17</sup> U. S. Dept. of Commerce, Bureau of Foreign and Domestic Commerce, in letter to the writers dated Sept. 14, 1928.

## APPENDIX OF TABLES

TABLE 15

MONTHLY CARLOT SHIPMENTS OF GRAPEFRUIT BY STATES OF ORIGIN,  
OCTOBER, 1922 TO SEPTEMBER, 1927

State and year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>
California:												
1922-23.....	12	42	56	53	84	37	18	40	15	29	112	54
1923-24.....	27	45	40	42	21	50	39	23	32	52	44	24
1924-25.....	34	36	48	42	36	43	45	37	33	60	11	10
1925-26.....	30	46	54	47	41	65	42	56	53	80	22	13
1926-27*.....	39	74	51	41	38	72	38	52	72	50	55	21
Florida:												
1922-23.....	1,331	1,836	1,547	2,513	1,919	2,776	2,046	1,946	607	172	66	443
1923-24.....	1,992	2,482	1,573	2,417	2,700	2,789	2,190	2,296	533	165	34	13
1924-25.....	1,690	2,626	1,684	2,646	3,382	2,868	3,508	1,435	231	4		85
1925-26.....	881	1,942	1,821	2,491	2,075	2,089	1,730	1,951	205	8		20
1926-27*.....	533	2,810	1,741	2,590	2,401	2,882	2,498	1,560	245	6	1	171
Texas:												
1922-23.....			17	17	6	6						
1923-24.....	1	16	18	21	35	8						
1924-25.....	8	62	33	86	113	129	82	5	3			
1925-26.....	8	110	113	54	12	1						
1926-27*.....	74	196	167	185	112	10	3					
Arizona:												
1922-23.....	23	15	10	16	22	16	1					
1923-24.....	38	17	16	14	23	22	12	12	1			
1924-25.....	41	34	23	34	14	7	5	1				3
1925-26.....	40	24	20	26	35	47	15	7	1			3
1926-27*.....	36	15	15	26	30	44	27	14				12
Total:												
1922-23.....	1,366	1,893	1,630	2,599	2,031	2,835	2,035	1,986	622	201	178	497
1923-24.....	2,058	2,560	1,647	2,494	2,779	2,869	2,241	2,331	566	217	78	37
1924-25.....	1,773	2,758	1,788	2,808	3,545	3,047	3,640	1,478	267	64	11	98
1925-26.....	959	2,122	2,008	2,618	2,163	2,202	1,787	1,014	259	88	22	36
1926-27*.....	682	3,095	1,974	2,842	2,581	3,008	2,566	1,626	317	56	56	204

\* Preliminary data—subject to revision.

Sources of data: U. S. Dept. Agr. Bur. Agr. Econ., Crops and Markets, monthly issues, except for California, which are from table 16.

TABLE 16

MONTHLY CARLOT SHIPMENTS OF GRAPEFRUIT, CALIFORNIA BY DISTRICTS,  
OCTOBER, 1922 TO SEPTEMBER, 1927

District and year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>	<i>cars</i>
Northern district:												
1922-23.....												
1923-24.....							1					
1924-25.....												
1925-26.....												
1926-27*.....	2	2	2								1	
Central district:												
1922-23.....	12	24	33	45	66	23	8	8	3			
1923-24.....	13	32	29	26	8	19	17	12	8	5	11	17
1924-25.....	33	32	30	26	22	26	19	14	3		1	7
1925-26.....	26	26	33	32	22	37	19	19	16	2	1	7
1926-27*.....	33	31	24	12	19	36	17	5				
Southern district:												
1922-23.....		2	5	2	10	10	10	32	12	29	112	54
1923-24.....	13				4	9	15	11	24	47	33	7
1924-25.....	1	1	3	3	4	5	21	23	30	60	10	3
1925-26.....			1	1		16	19	34	37	78	21	5
1926-27*.....				1		10	19	45	72	50	54	21
Imperial Valley:												
1922-23.....		16	18	6	8	4						
1923-24.....	1	13	11	16	9	22	6					
1924-25.....		3	15	13	10	12	5					
1925-26.....	4	20	20	14	19	12	4	3				1
1926-27*.....	6	41	25	26	19	26	2	2				
Total:												
1922-23.....	12	42	56	53	84	37	18	40	15	29	112	54
1923-24.....	27	45	40	42	21	50	39	23	32	52	44	24
1924-25.....	34	36	48	42	36	43	45	37	33	60	11	10
1925-26.....	30	46	54	47	41	65	42	56	53	80	22	13
1926-27*.....	39	74	51	41	38	72	38	52	72	50	55	21

\* Preliminary data—subject to revision.

Sources of data: U. S. Dept. Agr. Bur. Agr. Econ. unpublished data (revised) except for 9 months, January to October, 1927, which are from: Yoeman, Opal V. Summary of carlot shipments of important fruits and vegetables in California, Arizona, and Nevada, 1927. U. S. Dept. Agr. Bur. Agr. Econ., mimeographed circular, 1928.



TABLE 17

ESTIMATED COMMERCIAL PRODUCTION OF GRAPEFRUIT, UNITED STATES, 1919-1927

Crop year ending in	California	Florida	Texas	Arizona	Total U. S.
	<i>1000 boxes</i>	<i>1000 boxes</i>	<i>1000 boxes</i>	<i>1000 boxes</i>	<i>1000 boxes</i>
1919	311	3,200			3,511
1920	263	5,500			5,763
1921	304	5,100		19	5,423
1922	277	6,000	3	25	6,305
1923	304	7,200	19	41	7,564
1924	242	8,000	40	62	8,344
1925	242	8,200	208	64	8,714
1926	328	6,500	119	87	7,034
1927	348	7,000	299	84	7,731

Sources of data:

Florida: U. S. Dept. Agr. Bur. Agr. Econ. Market prospects for citrus fruits, 1927-28:8, 1927 (mimeo.). This is fruit to move by rail and boat and includes express movement.

California: Compiled by California Fruit Growers Exchange from reports of railroads on carlot loadings.

Texas and Arizona: Carlot shipments from table 3 converted to boxes on the basis of 400 boxes per car.

TABLE 18

WEIGHTED AVERAGE PRICES RECEIVED FOR GRAPEFRUIT F.O.B. CALIFORNIA, BY THE CALIFORNIA FRUIT GROWERS EXCHANGE, 1911-12 TO 1926-27

Crop year*	F. O. B. Price		All commodity index numbers of wholesale prices
	Dollars per packed box	Per cent of 1912-15 average	
	1	2	3
1911-12	2.63	120	99
1912-13	2.55	116	102
1913-14	1.94	88	100
1914-15	1.66	76	101
1915-16	1.83	83	117
1916-17	1.91	87	165
1917-18	2.20	100	192
1918-19	2.74	125	206
1919-20	2.23	102	236
1920-21	2.37	108	158
1921-22	3.17	144	149
1922-23	2.29	104	158
1923-24	2.47	112	152
1924-25	3.22	148	161
1925-26	3.15	144	155
1926-27	3.06	139	149

\* Years 1911-12 to 1918-19, September to August. Years 1919-20 to 1926-27, November to October.

Sources of data:

Col. 1. California Fruit Growers Exchange.

Col. 3. U. S. Bur. of Labor Statistics index numbers of wholesale prices of all commodities converted to 1910-14 base, published in The Agricultural Situation.

TABLE 19

AVERAGE MONTHLY PRICES\* PER BOX RECEIVED FOR GRAPEFRUIT, F.O.B.  
CALIFORNIA, BY THE CALIFORNIA FRUIT GROWERS EXCHANGE,  
OCTOBER, 1921 TO SEPTEMBER, 1927

Month	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
	<i>dollars</i>	<i>dollars</i>	<i>dollars</i>	<i>dollars</i>	<i>dollars</i>	<i>dollars</i>
October.....	2.76	4.44	1.92	3.10	3.75	3.42
November.....	2.54	3.00	2.81	2.48	2.85	3.14
December.....	2.35	2.43	2.38	2.51	2.73	2.77
January.....	2.27	2.31	2.01	2.44	2.32	2.44
February.....	2.32	2.60	2.50	2.58	2.52	2.74
March.....	2.53	2.78	2.35	2.60	2.74	2.83
April.....	2.64	2.90	2.20	3.02	3.16	2.92
May.....	3.20	2.64	2.07	3.14	3.04	2.93
June.....	3.94	2.30	2.36	3.88	3.19	3.08
July.....	3.61	2.38	2.32	3.85	3.29	3.24
August.....	4.28	1.64	2.92	4.37	3.77	3.03
September.....	5.77	1.86	2.86	3.82	3.93	3.26

\* Prices are weighted average prices for grapefruit shipped during the month shown.

Source of data: California Fruit Growers Exchange.

TABLE 20

GENERAL IMPORTS OF GRAPEFRUIT INTO THE UNITED STATES, BY MONTHS,  
SEPTEMBER, 1922 TO AUGUST, 1927  
(Boxes of 60 pounds net.)

Month	1922-23	1923-24	1924-25	1925-26	1926-27
	<i>boxes</i>	<i>boxes</i>	<i>boxes</i>	<i>boxes</i>	<i>boxes</i>
September.....	110,082*	82,002	88,552	119,742	137,428
October.....	74,684*	62,767	101,067	51,831	70,403
November.....	6,520	4,412	10,518	11,812	17,561
December.....	6,050	3,231	3,458	3,610	6,332
January.....	9,283	2,514	854	3,031	1,710
February.....	19,883	3,795	3,941	2,136	1,720
March.....	20,585	4,053	3,390	6,954	719
April.....	14,174	8,498	2,320	12,946	78
May.....	14,006	6,256	4,371	1,190	32
June.....	7,458	1,820	6,623	1,155	19
July.....	2,421	2,555	3,288	5,325	2
August.....	14,153	26,297	14,945	32,707	68
Total.....	299,239	208,200	243,327	252,439	236,072

\* Estimated from the reported value.

Source of data: U. S. Dept. Commerce. Monthly Summary of Foreign Commerce of the United States, monthly issues.

TABLE 21

UNITED STATES RECEIPTS OF GRAPEFRUIT FROM PORTO RICO, BY MONTHS,  
SEPTEMBER, 1922 TO AUGUST, 1927

Month	1922-23	1923-24	1924-25	1925-26	1926-27
	<i>boxes</i>	<i>boxes</i>	<i>boxes</i>	<i>boxes</i>	<i>boxes</i>
September.....	81,807	52,459	61,657	141,942	171,423
October.....	108,375	114,389	170,657	270,141	158,102
November.....	53,442	22,426	33,666	72,760	70,559
December.....	21,834	12,467	7,082	51,506	4,876
January.....	36,059	46,177	14,275	46,122	2,010
February.....	30,783	44,015	19,276	26,202	15,688
March.....	32,268	67,162	32,201	62,470	23,038
April.....	24,559	96,199	64,647	55,332	28,011
May.....	24,462	105,277	53,290	46,364	49,697
June.....	11,153	69,100	33,914	8,893	135,262
July.....	17,222	54,876	16,390	12,220	58,864
August.....	19,755	34,195	10,916	21,166	30,799
Total.....	461,719	718,742	517,971	815,118	748,329

Source of data: U. S. Dept. Commerce, Bur. Foreign and Domestic Commerce, by correspondence.

